I claim:

1. A two-way actuator formed of composite material, wherein the composite material comprises:

a first component comprising a first shape memory alloy; and

a second component comprising an elastic metal;

wherein said first component and said second component are metallurgically bonded together to form said composite material;

wherein said two-way actuator has a first shape at a first temperature equal to or above a temperature $A_f$ at which transformation of the first component from martensite to austenite is complete, and said two-way actuator has a second shape at a second temperature equal to or below a temperature $M_f$ at which transformation of the first component from austenite to martensite is complete;

wherein at said first temperature, said first shape memory alloy exerts a force against said second component which elastically deforms said second component so that said composite material has said first shape; and

wherein at said second temperature, said force from said first shape memory alloy is at least partially released and a bias force of said second component acting on said first shape memory alloy returns the composite material to said second shape.

2. The composite material of claim 1, wherein the first component is nitinol.

3. The composite material of claim 1, wherein the second component is selected from the group consisting of a second shape memory alloy, stainless steel, cobalt alloy,

refractory metal or alloy, precious metal, titanium alloy, nickel superalloy, and combinations thereof.

4. The composite material of claim 3, wherein the second component is selected from the group consisting of nitinol, stainless steel 316, austenitic stainless steels, precipitation hardenable steels including 17-4PH, 15-4PH and 13-8Mo, MP35N, ELGILOY®, Ta, Ta-10W, W, W-Re, Nb, Nb1Zr, C-103, Cb-752, FS-85, T-111, Pt, Pd, beta Ti, Ti6Al4V, Ti5Al2.5Sn, Beta C, Beta III, and FLEXIUM®.

5. The composite material of claim 1, wherein the first component and the second component form a bi-layer, tri-layer, or intermittent layer structure.

6. The composite material of claim 5, wherein the layered structure forms a tube.

7. The composite material of claim 5, wherein the layered structure forms a sheet.

8. The composite material of claim 5, wherein the layered structure has at least four layers.

9. The composite material of claim 1, wherein the first component and the second component form a multilayered solid clad structure.

10. The composite material of claim 9, wherein the first component is clad around a core of the second component.

11. The composite material of claim 9, wherein the second component is clad around the first component.

12. The composite material of claim 1, formed into a spring, coil, rod, wire, beam, strip, membrane, or washer.

13. A method of using the two-way actuated composite material of claim 1, comprising:

cooling said composite material below $M_f$ of the first component;

heating said composite material above $A_f$ of the first component;

cooling said composite material below $M_f$ of the first component.

14. The method of claim 13, wherein $M_f$ and $A_f$ are between -200°C to 170°C.

15. The method of claim 14, wherein $M_f$ is greater than approximately body temperature.

16. The method of claim 14, wherein $M_f$ is greater than approximately 0°C.

17. The method of claim 14, wherein $A_f$ is less than approximately body temperature.

18. The method of claim 14, wherein $A_f$ is less than approximately 100°C.

19. A method of providing two-way actuation, comprising:

providing a composite material comprising a first component comprising a first shape memory alloy and a second component comprising an elastic metal;

metallurgically bonding said first component and said second component together;

heat treating and shaping said composite material so that said composite material has a first shape at a first temperature equal to or above a temperature $A_f$ at which transformation of the first component from martensite to austenite is complete, and said composite material has a second shape at a second temperature equal to or below a temperature $M_f$ at which transformation of the first component from austenite to martensite is complete;

heating said composite material to said first temperature, wherein said first component exerts a force against said second component which elastically deforms said second component so that said composite material has said first shape; and

cooling said composite material to said second temperature, wherein said force from said first component is at least partially released and a bias force of said second component acting on said first component returns the composite material to said second shape.

20. The method of claim 19, wherein the second component is selected from the group consisting of a second shape memory alloy, stainless steel, cobalt alloy, refractory metal or alloy, precious metal, titanium alloy, nickel superalloy, and combinations thereof.